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ABSTRACT

Research results show that there is little loss in student productivity when changing from small lecture classes to large sections in principles of economics courses. A large lecture section of a college level principles of economics course with undergraduate tutors providing personal assistance to students was compared with six classes of 35 to 40 students each. To measure change in economics knowledge and attitudes toward economics brought about as a result of the course, the Revised Macro Test on Understanding College Economics and the Questionnaire on Student Attitude toward Economics were administered to both the experimental and control sections. The large class out-performed the small classes in changes in economic knowledge. Previous research studies, with the exception of an earlier study done by the authors of this paper, have indicated that there is little difference in economic knowledge gained between large and small sections, but that generally a significant difference in attitude could be expected, i.e., students in large groups do not like economics. However, although student attitudes were slightly more negative in the large class, the differences were not statistically significant. (RM)

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LARGE VS. SMALL LECTURES IN THE PRINCIPLES COURSE: THE DILEMMA OF THE SMALL DEPARTMENT

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LARGE VS. SMALL LECTURES IN THE PRINCIPLES COURSE: THE DILEMMA OF THE SMALL DEPARTMENT

Curtis H. Adams and Charles R. Britton

At Michigan State University during a typical full term almost 2,000 students take the principles course. If we taught the course in sections of 30 students each, we would need about 65 such sections. The economics department numbers 31 or 32 persons, and two sections make up a full teaching load. This means that if principles were taught in relatively small sections by regular staff members, their entire time would be taken by the principles course.

Alan B. Mandelstamm

INTRODUCTION

Academic departments in Colleges and Universities possess certain characteristics similar to private business ifrms. They have limited resources allocated to them, and with these resources are expected to produce predetermined outputs. The identification of those outputs are dependent upon the mission of the institution of which they are a sub-member, but in almost all cases, the output is multi-dimensional.

The most common, and general, breakdown of outputs are teaching, research, and service. Each of these categories are, of course, borken down into subcategories such as undergraduate teaching, beginning and upper level, and graduate education. Under "research" sub-categories are "papers", "articles," "monographs," "grants," "books," etc. We are all familiar with the various breakdowns of the output of academia. As with all producing units, a department may vary the composition and type of output by changing allocation of resources between outputs (i.e., one can increase research output by decreasing teaching, etc.).

It might be noted that these outputs are not necessarily homogeneous. Research efforts vary widely among departments and institutions. It is also

possible to distinguish the teaching output from one University to another. Indeed, if the quality is suspect, the output may be rejected through non-transferability of credits from one institution to another. Accreditation by different agencies is another example.

The Problem

In the most recent time period, academic departments in large Mega-Universities which have developed a major commitment to graduate education, have reallocated permanent faculty resources away from undergraduate teaching, and towards research. The model most used in accomplishing this reallocation has been one in which there is (1) a restructuring of beginning classes into large lecture, small recitation sections and (2) the use of graduate students as recitation section leaders (teacher assistants). All major academic disciplines, including Economics, have used this format. To rationalize larger classes, research has been conducted in which the output (student knowledge) of large lecture classes has been compared with smaller more "traditional" classes. In general, the knowledge "produced" in large classes has not been significantly different than that in small classes (1, 2, 3, 8, 9, 12). The major objection to large lecture classes has been the alienation that comes with the anonymity of a large section. The small lecture sections were designed to (and probably do) partially offset this objection. At least the student had some personal contact with a teacher. The released resources were, as noted before, re-allocated to the production of other outputs, which generally have been research and the teaching of graduate students. (4, 6, 7, 10)

Institutions without graduate programs, generally smaller state universities and private colleges, have for the most part, remained with the relatively small traditional classes. For a number of reasons the size of these traditional classes have been held down in most institutions, but it appears the principal reason for not going to the large lectures has been the absence of graduate students to serve as tutors and/or part-time teaching assistants. There is a generally held belief, undocumented as far as these authors can ascertain, that teaching assistants used in the classroom (as tutors and.or part-time instructors) must have obtained at least a Bachelor Degree, (i.e., be classified as graduate students). Supposedly, there is some requirement of professionalism that must be met before an adequate performance level is attainable. (8, 11)

The Research Setting

The research setting of this paper dates back to 1978 and the situation faced by the University of Arkansas. The University of Arkansas is a Ph.D. granting institution in the area of economics. The enrollment growth of the College of Business Administration of which the Department of Economics is a member expanded tremendously during the 1970's. The enrollment of undergraduate students increased steadily from 1,930 in 1974 to 3,851 in 1980. In 1978 with an undergraduate enrollment of 3,050 the College moved into a new building offering two new medium sized auditoria of approximately 120 seating capacity. While the student enrollment increased by 58 percent from 1974 to 1978 the economic faculty increased by only one member from a total of 12 to 13. The faculty remained steady at 13 even through the 1980-81 school year at which time the undergraduate

student enrollment had doubled. The growth in the graduate programs were not of the same magnitude; as a result of this and a financial squeeze, the number of part-time graduate instructors remained relatively constant during the time period. The net effect was an increase in the number of relatively large lecture sections which were offered. In 1978 two sections of about 120 students were offered with three one-hour lectures and one small discussion section per week. Four part-time graduate instructors conducted the small discussion sections. Attitudinal studies revealed a significant improvement in the attitude of students toward economics during the semester as the average value decreased from 2.9592 to 2.1400 where 1.0000 is a very high interest and 5.0000 was very low. The TUCE test was not administered at this time.

A further erosion of financial support for the University of Arkansas occurred from 1978 to 1980. As a result of no additional faculty and yet a further increase of business students from 3,050 to 3,851 the Economics faculty increased the number of large lecture sections from two up to four. At the same time the four graduate students were placed in charge of their own individual smaller classes. The small discussion sections were totally dropped and the large lecture classes received three one-hour lectures per week. For 1979 the attitude expressed toward economics improved from 3.1061 to 2.1791 over the course of the semester. In 1980 the improvement was from 2.6136 to 2.1778. The important element was that the attitude toward economics at the end of the class (2.1400 in 1978, 2.1791 in 1979, and 2.1778 in 1980) were not significantly different from the attitudes expressed by students in the smaller classes which averaged only 35 students.

The authors of this paper concluded at that time (1980) that there was no significant difference between larger class sizes (120) and smaller class sizes (35) with respect to knowledge gained or to attitude toward the subject. No effort was made to utilize larger auditoria which were available in other buildings on the campus.

The Department of Economics at the University of Missouri-Rolla has been faced with a similar growth problem as described above. It is a small (seven member) department, offering a B.S. and B.A. in Economics. The number of economics majors has grown over the last ten years to 100-120 and the number of minors in economics is around 80-100. The major responsibility has been as a service department teaching required principles courses to engineering and science students, which constitute the bulk (85%) of undergraduate students on campus. During the last ten years total enrollment on campus has grown from 4,500 to 7,500 students. The department has dropped from 9 to 7 members, and as noted the number of majors and minors has grown. The University of Missouri-Rolla has a fully developed graduate program in the Engineering and Physical Science departments so there is some pressure for research and grantsmanship.

The policy in the past has been to limit class size in the principles courses, with classes being closed out at 35-40 students. Objectively, with full-time faculty employees decreasing and demand for the principles courses increasing there was pressure to change the output mix away from research and upper level course offerings and toward principles. The administration was not necessarily in favor of a deemphasis of research.

In the Fall of 1983, a decision was made to offer, on a experimental basis, a large lecture section, with undergraduate tutors providing personal assistance to students who requested help since as noted earlier UMR does not have a graduate program. The student teacher assistants attended lectures, tutored students on an individual basis and provided both pre-tests and post-tests critique. The criteria in choosing the student assistants were (1) senior standing, (2) grade point, and (3) observed performance and command of the discipline. In other ways, the large section was a traditional lecture course.

At the same time a decision was made to offer the large section, it was decided that the endeavor should be evaluated. Six "regular" size sections at UMR would be compared to the large section. Reserach instruments administered to both the experimental and control sections were the Revised Macro Test on Understanding College Economics and a Questionnaire on Student Attitude toward Economics. These instruments would measure the change in (1) economics knowledge and (2) attitude toward economics brought about as a result of the course. Other variables collected for use in the evaluation were sex, nationality, class, and grade. Appendices 1 and 2 display the relevant results.

A review of the literature on economic education indicates that there was little difference (not statistically significant) in economic knowledge gained between large and small sections but generally, a significant difference in attitude could be expected. (1, 2, 8, 10, 12) In other words, students learn the material in large classes, but they don't necessarily like the subject. As pointed out earlier however this is not what the authors found in their earlier study at the University of Arkansas.

Research Results

The results as presented in Tables 1 and 2 were somewhat different than what was expected based upon the review of literature. The large class actually outperformed the small classes in changes in economic knowledge as measured by TUCE. The difference was statistically significant. This was certainly not expected and the results differed from other research undertaken of this type. (4, 5, 8, 9) There was no significant change in attitude in any of the sections. The large section did show a negative t. value, but it was not significant.

TABLE 1

Difference Between Post-Test and Pre-Test Class Scores on TUCE[a]

Variable	Parameter Estimate	T Ratio
Intercept	-1.363946	-1.2064
Sex	0.074207	0.1230
NAT	-0.110941	-0.1429
Term	0.713365	1.4930
Delta	0.419548	1.160
Grade	1.225159*	4 5876
Number	0.016085	4.4174

[a] R^2 = .1254
t critical = 1.645
*indicates significant estimation @ .05 confidence level.

TABLE 2

Difference Between Post-Test and Pre-Test Attitude Scores[a]

Variable	Parameter Estimate	T Ratio
Intercept	0.051673	0.2760
Sex	-0.095093	-0.9557
NAT	-0.021426	-0.1671
Term	-0.040323	-0.5090
Difference	0.011447	1.1160
Grade	0.034277	0.7559
Number	-0.001173*	-1.8190

[a] R^2 = .0256
t critical - 1.645
* indicates significant estimation @ .05 confidence level

When regression analysis was applied to the difference between Pre-TUCE and Post-TUCE as the dependent variable, the only independent variables which turned out significant were grade in course and size of class. They were significant at the .01 level. The data were for all principles sections, both small and large, and presented in Table 1.

When a regression was run on the change in attitude (attitude 1 - attitude 2) as the dependent variable, none of the independent variables turned out to be significant, although the large section had a minus t. coefficient. Table 2 displays these results.

CONCLUSION

Given the results from this experiment, one would have to conclude that there is little loss in productivity from switching to large sections of Principles of Macroeconomics. As expected, student attitudes may be more negative in the large class, but not statistically significant.

Given the low R^2, there are obviously a lot of variables that are not included in the regression equation, and therefore a certain uneasiness exists in making any sweeping conclusion. The results are conclusive enough, however, that if other departments of economics are facing the same sort of resource squeeze that is described, they may want to consider large sections, with undergraduate teaching assistants. The authors believe that the attitudes toward economics and effectiveness of the large section still depends primarily upon the quality of the individual teacher which is supported by an earlier study. (3)

APPENDIX 1

Were students in all classes initially from the same populations with respect to TUCE scores?

η_1 = average Pre-Test score in large classes

η_2 = average Pre-Test score in small classes

Hypothesis: $H_0 = \eta_1 = \eta_2$ or $\eta_1 - \eta_2 = 0$

$H_1 = \eta_1 \neq \eta_2$

With 95% confidence, critical resion is 1.96 x standard deviation of test statistic.

$$\sigma X_1 - X_2 = \sqrt{\frac{12.689}{165} + \frac{14.4684}{176}} = .39888$$

Critical Region (-.78, + .78)

$\eta_1 - \eta_2 = -.22$

$\therefore$ Accept H_0

APPENDIX 2

Were students in both types of classes achieving the same post-test scores?

$H_0 = \eta_1 - \eta_2 = 0$

$H_1 = \eta_1 \neq \eta_2$

95% confidence

$\sigma X_1 - X_2 = .47166$

Critical region (-.92, + .92) Test statistic, $\eta_1 - \eta_2 = 1.5$

$\therefore$ Reject H_0

Post test scores are not from the same population.

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